Computer Architecture

Some questions & answers

Prof. Nizamettin AYDIN, PhD

naydin@yildiz.edu.tr

http://www3.yildiz.edu.tr/~naydin

Q48 – A48

- Suppose that a given process requires a virtual address space of 2^8 words and physical addresses in the computing system contain 7 bits.
- Assume also that pages are 32 words in length

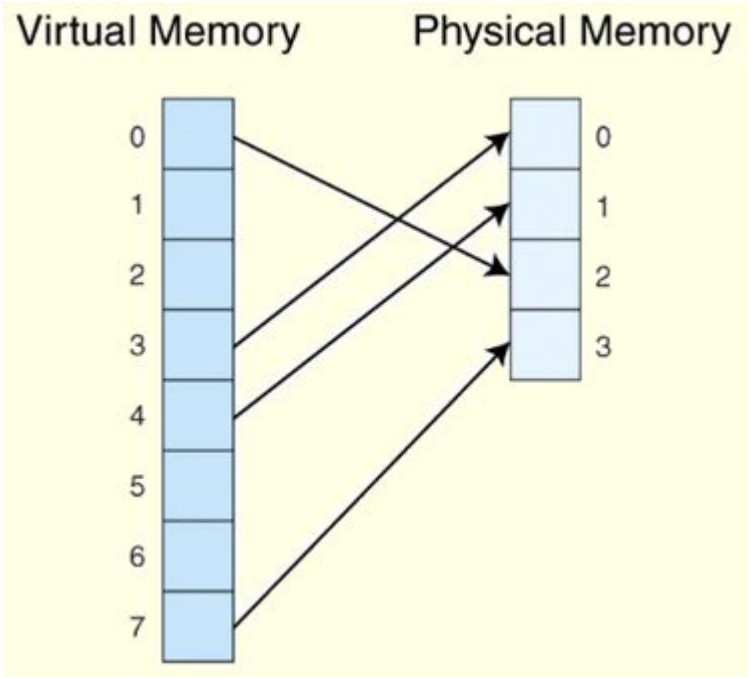
a. How many frames does the physical memory has?
  - 2^7 / 32 = 128 / 32 = 4 frames

b. How many pages does the virtual memory has?
  - 2^8 / 32 = 256 / 32 = 8 pages

Q48 – A48

- If some pages from the process have been brought into main memory as illustrated in the following figure,

c. what will be the contents of the page table?



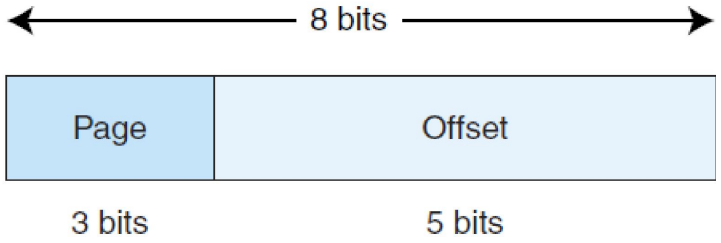
Page Page Table

Page	Frame #	Valid Bit
0	2	1
1	-	0
2	-	0
3	0	1
4	1	1
5	-	0
6	-	0
7	3	1

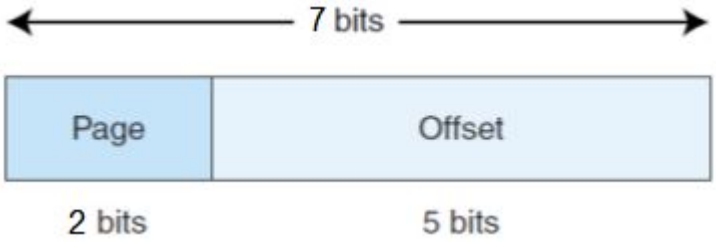
Q48-A48

- The logical page number is translated into a physical page frame through a lookup in the page table.

d. What will be the format for the virtual address?



e. What will be the format for the physical address?

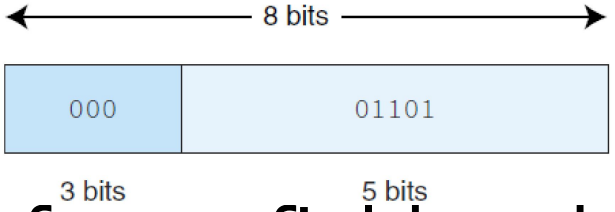


Q48-A48

- Suppose the system now generates the virtual address $13_{10} = 0D_{16} = 00001101_2$.

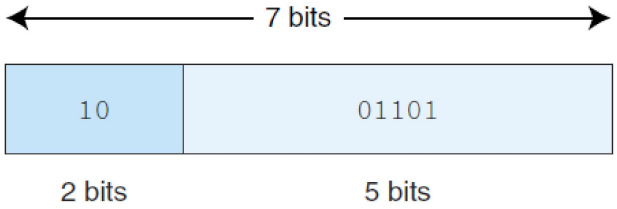
f. What will be the values of page field and offset field of virtual address?

- the page field = 0 = 000_2
- the offset field = 13 = 01101_2



g. What will be the values of frame field and offset field of physical address?

- the frame field = 2 = 10_2
- the offset field = 13 = 01101_2



Q49

- The following code is a part of an assembler program written for a three address machine type processor.

```
I1: ADD   R7, R5, R6
I2: MUL   R8, R7, R4
I3: ADD   R4, R2, R1
I4: DIV   R8, R1, R3
```

- Identify the type of all possible dependencies in this code.
  - true data or write-read dependency
  - output or write-write dependency
  - antidependency or read-write dependency

A49

- True data or write-read dependency : I1, I2 (R7, R7)

  I1: **ADD R7, R5, R6**
  I2: **MUL R8, R7, R4**
  I3: **ADD R4, R2, R1**
  I4: **DIV R8, R1, R3**

- Output or write-write dependency : I2, I4 (R8, R8)

  I1: **ADD R7, R5, R6**
  I2: **MUL R8, R7, R4**
  I3: **ADD R4, R2, R1**
  I4: **DIV R8, R1, R3**

- Antidependency or read-write dependency : I2, I3 (R4, R4)

  I1: **ADD R7, R5, R6**
  I2: **MUL R8, R7, R4**
  I3: **ADD R4, R2, R1**
  I4: **DIV R8, R1, R3**